Transformations!
aka "moving stuff around"

Transformations include:

- translations (movement)
- rotations (turning)
- reflections (flipping)

These are often referred to as "rigid motions" because the actual shape of the object does NOT change. Can you name the transformation that DOES change an object?

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The transformation that does change an object is:

- dilation (resizing)

We saw this with similar polygons that were simply different sizes but had the same angle measures.

A dilation is NOT a rigid motion. It does not preserve the size of the object.

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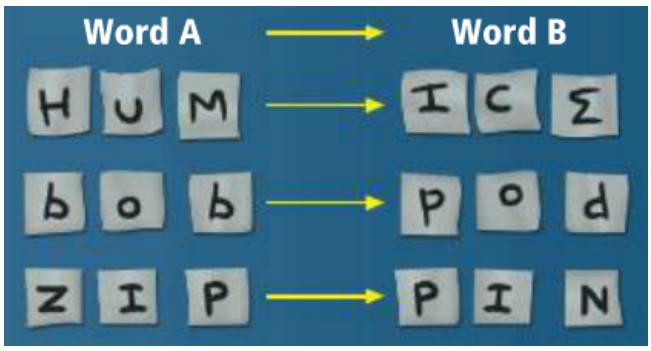

Check out the transformed letters. Each letter has been translated in some way from word A to word B. Can you figure out how each one was transformed?

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A **transformation** of a geometric figure is a function, or *mapping* that results in a change in the position, shape, or size of the figure. When you play dominoes, you often move the dominoes by flipping them, sliding them, or turning them. Each move is a type of transformation. The diagrams below illustrate some basic transformations that you will study.

The domino flips. The domino slides. The domino turns.

We will use the term "mapping" to describe how the position of an object changes due to a transformation.

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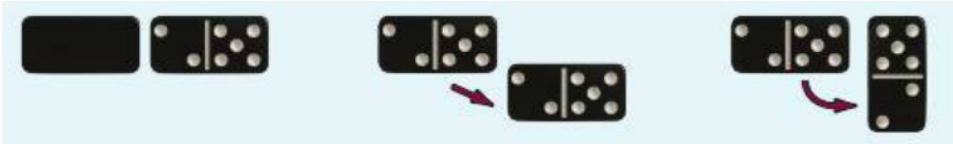
When performing transformations we refer to the *original object* as the *preimage*.

The *transformed object* is called the *image*.



With our dominoes, the object on the left is the preimage and the one on the right (the transformed one) is the image.

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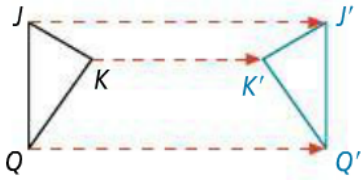
Mapping

A transformation maps every point of a figure onto its image and may be described with arrow notation (→). Prime notation (′) is sometimes used to identify image points. In the diagram below, K' is the image of K.



$\triangle JKQ \rightarrow \triangle J'K'Q'$
$\triangle JKQ$ maps onto $\triangle J'K'Q'$.

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Example

In the diagram, $EFGH \rightarrow E'F'G'H'$.

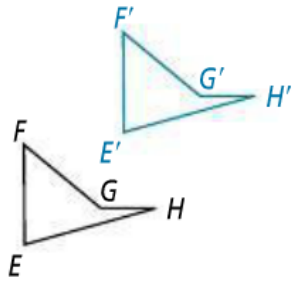
A What are the images of $\angle F$ and $\angle H$?

$\angle F'$ is the image of $\angle F$. $\angle H'$ is the image of $\angle H$.

B What are the pairs of corresponding sides?

$\overline{EF}$ and $\overline{E'F'}$ $\quad$ $\overline{FG}$ and $\overline{F'G'}$

$\overline{EH}$ and $\overline{E'H'}$ $\quad$ $\overline{GH}$ and $\overline{G'H'}$



$EFGH \rightarrow E'F'G'H'$

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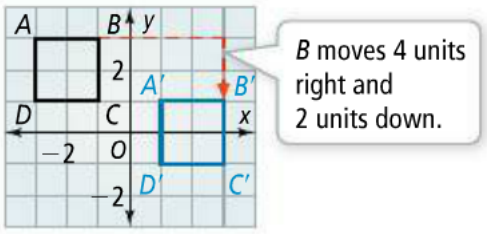
Example

The diagram at the right shows a translation in the coordinate plane. Each point of $ABCD$ is translated 4 units right and 2 units down. So each (x, y) pair in $ABCD$ is mapped to $(x + 4, y - 2)$. You can use the function notation $T_{<4, -2>}(ABCD) = A'B'C'D'$ to describe this translation, where 4 represents the translation of each point of the figure along the x-axis and -2 represents the translation along the y-axis.



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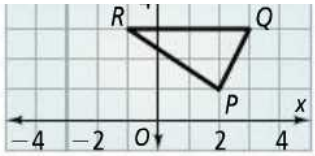
What are the vertices of $T_{\langle -2, -5\rangle}(\triangle PQR)$? Graph the image of $\triangle PQR$.



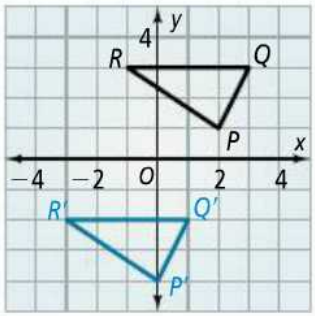
Identify the coordinates of each vertex. Use the translation rule to find the coordinates of each vertex of the image.

$T_{\langle -2, -5\rangle}(P) = (2 - 2, 1 - 5)$, or $P'(0, -4)$.

$T_{\langle -2, -5\rangle}(Q) = (3 - 2, 3 - 5)$, or $Q'(1, -2)$.

$T_{\langle -2, -5\rangle}(R) = (-1 - 2, 3 - 5)$, or $R'(-3, -2)$.

To graph the image of $\triangle PQR$, first graph P', Q', and R'. Then draw $\overline{P'Q'}$, $\overline{Q'R'}$, and $\overline{R'P'}$.



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